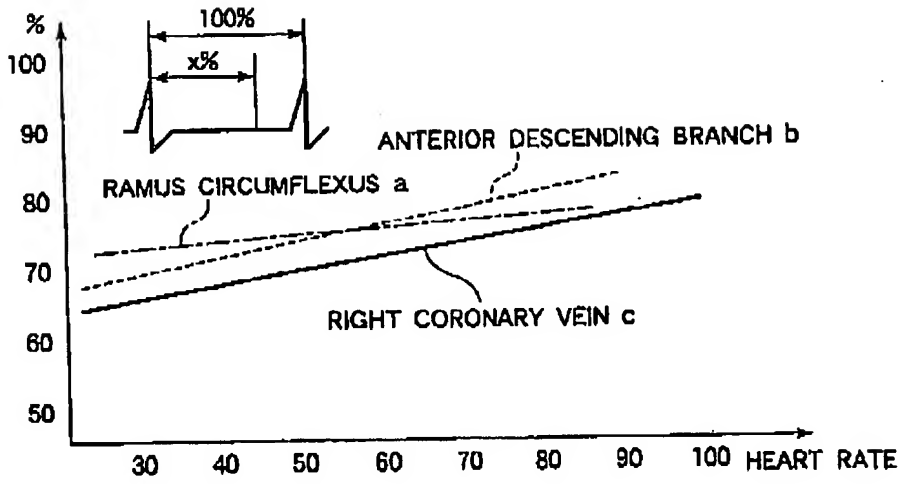
REMARKS

The application has been reviewed in light of the Office Action dated May 13, 2008. Claims 2-5, 7, 8 and 11-19 were pending, with claims 1, 6, 9 and 10 having previously been canceled, without prejudice or disclaimer By this Amendment, claims 2, 3 and 15 have been amended to clarify the claimed subject matter, and new claims 20-23 have been added. Accordingly, claims 2-5, 7, 8 and 11-23 are now pending, with claims 2, 8 and 15 being in independent form.

Claims 1-5 were rejected under 35 U.S.C. § 102(b) as purportedly anticipated by U.S. Patent No 5,832,051 to Lutz. Claims 1-19 were rejected under 35 U.S.C. & 102(e) as purportedly anticipated by U.S. Patent No. 6,381,487 to Flohr.

As previously discussed of record, this application relates to an improved approach devised by applicant for obtaining a tomographic image whereby motion artifacts, such as due to a heartbeat or other cardiovascular activity, can be minimized. An aspect of the present application includes determining the static cardiac time phase of a predetermined portion of the subject based on correlation data between heartbeat information and a static cardiac time phase of each of a plurality of different portions of the subject, that are previously determined. As discussed in the application at, for example, paragraph [0037], the plurality of portions of the subject for which correlation data can be obtained include a right coronary artery, a left coronary artery, a ramus circumflexus, a lung artery, a lung vein, a lung field, etc. A graphical example of such correlation data between heartbeat information and a static cardiac time phase of each of a plurality of different portions of the subject is shown in Fig. 3 (reproduced below).

FIG.3



The cited art simply does not disclose or suggest use of such correlation data (heartbeat information and a static cardiac time phase of each of a plurality of different portions of the subject).

It is contended in the Office Action that Lutz, col. 5, lines 22-47 (reproduced below), proposes "determination of the measurements interval ΔM of each phase per rotation".

> In the case of the exemplary embodiment of the invention, the rotation time of the measurement system, which typically lies between 0.75 seconds and 1 second, substantially corresponds to the cycle time Z of the cardiac rhythm of the patient P, shortened by the measurement interval ΔM (ΔM≈1/6 Z), and the duration of the ***measurement interval ΔM corresponds approximately to a fifth of the rotation time of the measurement system, so that after approximately six rotations of the measurement system around the axis of rotation A, a phase displacement of 360°*** is achieved between the rotating measurement system and the cardiac rhythm of the patient P. This means that about six rotations of the measurement system around the patient P suffice to create a complete image of this cardiac phase from the data sets of measurement data of projections of a cardiac phase, recorded at five different angular positions α.
>
> After the determination of the measurement interval ΔM of each cardiac phase per rotation, and thereby the determination of the rotation time of the measurement system around the patient P, in the case of pulsed operation of the X-ray source 3 (cf. FIGS. 2(a)-2(e)) ***the physician determines the cardiac phases of the patient P that must be radiologically examined, for this purpose the physician orients himself or***

> ***herself so as to be able to see the display of the trigger signal synchronized to the cardiac rhythm of the patient, which is shown on the monitor of the control computer 12. ...***

Thus, Lutz, column 5, lines 22-47, proposes that the measurements interval ΔM is determined based on the cycle time Z of the cardiac rhythm of the patient P.

On the other hand, Lutz says nothing whatsoever regarding determining the measurements interval based on correlation data between the heartbeat information and the static cardiac time phase of each of different portions of the subject, that are previously determined (independent claims 2 and 15 of the present application).

Flohr likewise does not disclose or suggest such aspect of the present application.

Applicant submits that the cited art, even when considered along with common sense and common knowledge to one skilled in the art, does ***NOT*** render unpatentable such aspect of the present application.

Accordingly, applicant respectfully submits that independent claims 2 and 15, and the claims depending therefrom, are allowable over the cited art.

It is contended in the Office Action that Flohr, col. 5, lines 17-44 (reproduced below), proposes summation of the projections which results in an error criterion [CT value].

> Such an automatic analysis can, for example, be implemented as a comparison of complementary projections in parallel geometry. Complementary parallel projections belong to projection angles offset by 180°. Since current CT apparatuses usually register fan projectors, the parallel projections must first be produced therefrom by suitable interpolation and sorting rules, for example known re-binning techniques. A parallel projection also combines measured values from fan projections measured at different times. For example, the measuring time of its central channel can be defined as the measuring point in time of a parallel projection. Given a symmetrical detector with a number of detector elements arranged in a line corresponding in number to the number of measuring channels, the symmetry theorem applies for complementary parallel projections P(n,k) in the case of a stationary subject, resulting in

$$P(N+n,K-k-1)=P(n,k)\ (N=O(1)(N-1),\ k=O(1)(K-1))$$

wherein

n: projection number,

k: channel number (continuous numbering of the detector elements, whereby the central channel is the middle channel),

N: plurality of parallel projections measured per 180° revolution angle, and

K: plurality of channels per parallel projection.

Given an immobile subject, the difference P(N+n,K-k-1)-P(n,k) is equal to 0. The deviation of the difference from 0 is thus a criterion for the movement of the measured subject in the time $T_{ROT}/2$ (half the revolution time of the radiation source) during a half-revolution between the projections n and n+N. A suitable dimensional number is, for example, the sum of absolute deviations of the complementary parallel projections $\sigma_c(n)$ with:

$$\sigma_c(n)=SUM_{(k=K_a(1)Ke)}\{ABS[P(N+n,K-k-1)-P(n,k)]\}$$

The start and end channels K_a and Ke determine an interior region of the measuring field in which it is anticipated the heart is registered.

Thus, Flohr, col. 5, lines 17-44, merely proposes that the sum of absolute deviations of the complementary parallel projections σc(n) is used for determining whether the projections should be registered during the resting phase of the hear or not. In the approach proposed by Flohr, the heartbeat information is not used for determining the static cardiac time phase, and the projection data is not topographic image data.

On the other hand, the subject matter of claim 8 includes determining the static cardiac time phase by generating a sample tomographic images having respective different cardiac time phases based on both the projection data and the heartbeat information, and selecting a sample tomographic image with a small amount of motion artifacts from the sample images, so that a tomographic image with a small amount of motion artifacts can be acquired at an arbitrary sliced position even if the static cardiac time phase varies. The cited art simply does not disclose or suggest such aspect of claim 8 of the present application.

Applicant submits that the cited art, even when considered along with common sense and

common knowledge to one skilled in the art, does ***NOT*** render unpatentable such aspect of claim 8 of the present application.

Accordingly, applicant respectfully submits that independent claim 8 and the claims depending therefrom are allowable over the cited art.

In view of the remarks hereinabove, Applicant submits that the application is now in condition for allowance, and earnestly solicits the allowance of the application.

If a petition for an extension of time is required to make this response timely, this paper should be considered to be such a petition. The Patent Office is hereby authorized to charge any fees that are required in connection with this amendment and to credit any overpayment to our Deposit Account No. 03-3125.

If a telephone interview could advance the prosecution of this application, the Examiner is respectfully requested to call the undersigned attorney.

Respectfully submitted,

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